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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,953	01/16/2004	Kiyoshi Satoh	ASMJP.055DV1	8185

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EXAMINER	
HASSANZADEH, PARVIZ	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/759,953	SATOH ET AL.	
	Examiner	Art Unit	
	Parviz Hassanzadeh	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) *11-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 14-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claim 1 is generic to a plurality of disclosed patentably distinct species comprising:

Species 1, Fig. 1, pages 12-17;

Species 2, Fig. 2, page 17;

Species 3, Fig. 3, pages 17-25; and

Species 4, Fig. 5, pages 25-31.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, even though this requirement is traversed.

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Adeel S. Akhtar on 7/27/04 a provisional election was made with traverse to prosecute the invention of Species 4 (Fig. 5), claims 1-10 and 14-44. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-13 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

The disclosure is objected to because of the following informalities: on page 29, line 3, it is suggested to change 12 to 162 in accord with Fig. 5; and on page 29, last line, it is suggested to change 780?C to 780 °C.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5 and its dependent claims 6-9, claim 27 and its dependent claim 28, and claim 41 and its dependent claims 42-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 5, 27 and 41, the word "type" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "type"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 14, 16-19, 33-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Noble et al (US Patent No. 6,450,116 B1).

Noble et al teach a rapid thermal processing apparatus (Fig. 3A) (*a chemical vapor deposition device*) comprising:

a process chamber 213 (*a deposition reaction chamber*);

a remote plasma discharge 300 (*a plasma discharge chamber that is provided remotely from the reaction chamber*); and

an inlet member 360 (*a piping that links the reaction chamber and the remote plasma discharge chamber*),

the apparatus includes as gas inlet 269 formed through sidewall 214 for injecting a process gas into chamber 213 to allow various processing steps to be carried out in the chamber 213, for example, a plasma gas may be nitrogen, wherein activated plasma species are capable of cleaning the reaction chamber contaminated with a previously coating step in the reaction chamber 213 (*wherein energy coupled to the remote plasma discharge chamber activates cleaning gas within the plasma discharge chamber, and the*

activated cleaning gas is brought into the inside of the reaction chamber through the piping and changes solid substances adhered to the inside of the reaction chamber as a consequence of film formation, to gaseous substances, thereby cleaning the inside of the reaction chamber),

the piping 360 may be made of aluminum (*wherein internal surfaces of the piping comprises a metal not corroded by the activated cleaning gas species*) (column 6, line 51 through column 8, line 45, and column 11, lines 36-45).

Further regarding claims 2, 38: The particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not limit an apparatus claim, see *In re Casey,* 152 USPQ 235; *In re Rishoi,* 94 USPQ 71; *In re Young,* 25 USPQ 69; *In re Dulberg,* 129 USPQ 348; *Ex parte Thibault,* 64 USPQ 666; and *Ex parte Masham,* 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on the inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

Further regarding the claims 14, 17-18: The piping member 360 as shown in Fig. 3A is straight between the remote plasma discharge chamber and the reaction chamber. The process gas entering into the reaction chamber 213 from the inlet 214 and passing over the substrate 100 in the reaction chamber and being exhausted via 253 as shown in Fig. 3A.

Further regarding the claims 19, 34: The apparatus further including light pipe assembly 218 including lamps 219 disposed between *quartz* plates 247, 248 (column 7, line 59 through column 8, line 36).

Further regarding the claims 16, 33: The apparatus further includes a magnetron which can generate between 1.5 and 6.0 kilowatts (1500 W – 6000 W)of energy (column 12, lines 4-14). Further it has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley,* 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.,* 15USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed dos not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham,* 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114.

Further regarding the claim 35: The remote plasma applicator 300 (Fig. 4) includes a body 305 of aluminum or stainless and a tube 320 made of quartz or sapphire (column 9, lines 15-27).

Further regarding the claim 36-37: The gas source (Fig. 3A) comprising a plurality of gas source 313, 315 (column 9, lines 28-45).

Further regarding the claim 39: the piping 360 may be made of aluminum which is resistant to corrosion by activated nitrogen species (column 11, lines 36-45).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3, 4, 15, 20-26, 29-32, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noble et al (US Patent No. 6,450,116 B1) in view of Iyer (US Patent No. 6,498,109 B2).

Noble et al teach all limitations of the claims as discussed above except for the frequency of the power source being between 300 kHz to 500 kHz, or the piping comprises a fluorine-passivated metal.

Regarding claims 15, 20, 29, 30, 32:

Iyer teaches a plasma processing apparatus (Fig. 1) including a remote plasma discharge 12 coupled to a plasma energy source 28, wherein the plasma energy source may be a pair of oppositely placed electrodes, inductive coils, or microwaves energy in order to create reactive species. The power from the energy source 28 is typically in the

range of 50 watts to 5 kW and the frequency can range between 10 kHz and 200 MHz (column 3, lines 24-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the plasma energy source as taught by Iyer in the apparatus of Noble et al as an art recognized equivalent of creating reactive species.

Regarding claim 3, 4, 23-25, 40:

Iyer also teach carbon tetra fluoride (CF4) is used in etching silicon, silicon oxide or other material used in manufacturing integrated circuit (column 1, lines 54-65).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use CF4 as an etching gas in the apparatus of Noble et al. The use of the fluorine-containing gas as etching gas would inherently cause the interior surface of the piping 360 which is made of aluminum become passivated with fluorine. The piping 360 is in contact with the plasma discharge and it heated by the plasma gas.

Further regarding the claim 26: The gas source (Fig. 3A) comprising a plurality of gas source 313, 315 (column 9, lines 28-45).

Further regarding claim 31 : the pressure in the plasma generating chamber may be between about 1.0 and 8 Torr and the pressure in the processing chamber may be between about 0.5 and 4.0 Torr (column 2, lines 43-48 of Noble et al)

Further regarding the claim 21-22: The apparatus further including light pipe assembly 218 including lamps 219 disposed between *quartz* plates 247, 248 (column 7, line 59 through column 8, line 36). The remote plasma applicator 300 (Fig. 4) includes a body 305 of aluminum or stainless and a tube 320 made of quartz or sapphire (column 9, lines 15-27).

Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noble et al (US Patent No. 6,450,116 B1) in view of Fujimura (US Patent No. 4,718,976).

Noble et al in view of Iyer teach all limitations of the claims as discussed above except for through-flow valve positioned between the remote plasma discharge chamber and the reaction chamber.

Fujimura teaches a plasma processing apparatus (Fig. 3A, 4) including a conductance regulating device (valve) including a conductance regulating plate 22 in the from of a disc having a circular opening 21 disposed between a remote plasma generating chamber 27 and a treating chamber 30. The introduction of gas may be regulated by using different diameter of opening 21, or by using a shutter mechanism. The gas conductance device may include a circular gas diffusion plate 25 which can be moved up and down to close and open the opening 21. the conductance regulating plate 22, gas diffusion plate 25, and barrier 32 may be made of material such as aluminum which is highly resistant to treating gas such as etching gas (column 3, line 19 through column 4, line 50). The valve is in contact with the plasma discharge and it heated by the plasma gas.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the gas regulating device as taught by Fujimura in the apparatus of Noble et al in order to regulate the rate of introduction of activated gas into the treating chamber.

Claims 27-28, 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noble et al (US Patent No. 6,450,116 B1) in view of Iyer (US

Patent No. 6,498,109 B2) as applied to claims 20 above, and in further view of Fujimura (US Patent No. 4,718,976).

Noble et al in view of Iyer teach all limitations of the claims as discussed above except for through-flow valve positioned between the remote plasma discharge chamber and the reaction chamber.

Fujimura teaches a plasma processing apparatus (Fig. 3A, 4) including a conductance regulating device (valve) including a conductance regulating plate 22 in the from of a disc having a circular opening 21 disposed between a remote plasma generating chamber 27 and a treating chamber 30. The introduction of gas may be regulated by using different diameter of opening 21, or by using a shutter mechanism. The gas conductance device may include a circular gas diffusion plate 25 which can be moved up and down to close and open the opening 21. the conductance regulating plate 22, gas diffusion plate 25, and barrier 32 may be made of material such as aluminum which is highly resistant to treating gas such as etching gas (column 3, line 19 through column 4, line 50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the gas regulating device as taught by Fujimura in the apparatus of Noble et al in order to regulate the rate of introduction of activated gas into the treating chamber.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (571)272-1435. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571)272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

P. Hassanzadeh

Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

August 9, 2004